Omnichannel, Microservices, and "Modern" Applications

How Are YOU Managing User Perceptions and the Customer Experience?

EMA™

*IT & DATA MANAGEMENT RESEARCH,
INDUSTRY ANALYSIS & CONSULTING*

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Overview

Delivering high-performing applications is becoming increasingly difficult as the applications themselves become increasingly componentized, heterogeneous, and distributed. Today, virtually every IT organization is delivering applications running on a wide variety of platforms, built over multiple technical architectures, and developed in multiple languages.

Traditional applications are being deconstructed and delivered as Service-Oriented Architecture (SOA)–based services or microservices. "Hybrid" applications and transactions are spanning on- and off-premise infrastructure. Mobile applications are accessing external services such as Google Maps and PayPal. Both business- and customer-facing applications are relying on Application Programming Interfaces (APIs) to connect user-facing apps to third-party systems capable of fulfilling an order or making a reservation. And the software components underlying applications are increasingly being hosted on Virtual Machines (VMs) or on container technology such as Docker.

To complicate matters, many early adopters of "modern" applications utilizing containers and microservices are also leveraging Continuous Delivery practices for delivering new code. Production environments are dynamically changing as Continuous Delivery accelerates change rates. Enterprise Management Associates (EMA) research finds that, of those companies practicing Continuous Delivery, nearly 65% are delivering new code weekly—or more frequently.

These complex, diverse, and dynamically changing application landscapes are part of a digital disruption that has multiple implications for both IT and business. From the IT perspective, Development and Operations are being pushed to their capacity limits. Less than half of IT professionals surveyed by EMA are confident that their Application Performance Management (APM) solutions adequately meet the monitoring requirements of modern IT environments. At the same time, "the business" needs these new types of services to perform well to satisfy existing customers and grow the customer base.

CA Technologies is building support for modern application delivery patterns into its product line, addressing the needs of today's IT organizations in a complex, customer-driven business climate.

This EMA white paper explores the challenges and benefits of delivering complex applications in an omnichannel landscape. It explores application delivery from the customer, corporate, and Line of Business (LOB) perspectives, with a focus on tools-driven automation supporting the delivery of complex applications at the high levels of quality that businesses demand and customers expect. Finally, it highlights the ways in which CA Technologies is building support for modern application delivery patterns into its product line, addressing the needs of today's IT organizations in a complex, customer-driven business climate.

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Application Delivery and User Empowerment

The industry trend towards an omnichannel customer experience is exacerbating the challenges of software delivery and support. Omnichannel is all about continuity of experience, regardless of where a customer may choose to begin engaging with a company. The initial engagement could be via a desktop, on a mobile device, over the phone, or in a store. From the business perspective, this trend can generate increased customer satisfaction and "stickiness" in the ongoing vendor-customer relationship. However, from the IT perspective, omnichannel delivery adds performance and availability risks to the already challenging task of managing complex application ecosystems.

Because of the breadth of technologies spanned by omnichannel transactions, and because delivery is network based, there are multiple risk factors in delivering these types of services. Factors which can impact application performance and availability include:

- **Variable network bandwidth** – When customers interact from multiple locations and on multiple devices, connectivity is necessarily unpredictable. They could be interacting with the vendor's application via 3G or 4G mobile connections, laptops in home or office with wired network connections, or tablets connected to WiFi. In other words, the connection could be fast, slow, or intermittent, leading to variable and unpredictable service performance.

- **Integrations and APIs** – Omnichannel applications are often supported by containerized or component-based services that connect during runtime via APIs. Each such integration is a potential point of failure, which could be due to connectivity issues, software "bugs", misconfigurations, or a host of other potential causes.

- **Third-party connections** – Often omnichannel services connect to third-party systems to verify a payment, place an order, or complete a banking transaction. When the applications owned by Company A access services hosted by Company B, Company A has little or no control over how well Company B's service performs. However, poor performance on the side of the third-party service can adversely affect overall application performance or availability as experienced by the user. Unfortunately, users have no knowledge of the behind-the-scenes execution architecture of the app provided by Company A, which they are accessing using their mobile devices. They perceive the problems as being the fault of the app or the provider, and may well abandon a transaction or de-install as a result.

While the list of potential performance and availability risks could go on and on, the bottom line is that users are disrupted. This is when the tweets start and the application provider is left to control damaging user fallout.

There are also multiple potential points of security failure, making security-related monitoring solutions a critical investment. APIs open up a company's systems to external users. Network-centric transactions executing across multiple hardware and software platforms have multiple potential points of security failure, from transaction interception at the network level to endpoint security on the platforms hosting execution components. The impact of such failures is clear from the multiple retail-related breaches seen in recent years. Customer confidence is shaken, costs of credit monitoring and credit card replacement skyrocket, and brand equity decreases.

Device diversity presents an additional challenge, since it is often the case that different web versions are delivered to customers, depending on the type of device in use. While testing for each potential device and connection combination can be expensive, customers expect a seamless and responsive interactive experience regardless of how or where they engage with a company.

The technical risks are magnified by the fact that relatively few companies have tools in place to monitor the types of technologies and complex execution ecosystems that omnichannel delivery implies. Tools portfolios are simply missing the features required to test and monitor these new types of services.

This risk potential is being clearly perceived at all levels of the enterprise. EMA's latest research on IT and Digital Transformation[1] found that "improved user/customer experience management" and "improved application performance management" are the "most important" functional priorities supporting Digital Transformation for 2016 (see Figure 1). Clearly, both business and IT recognize the value proposition of high-performing software and its overwhelming impact on business success—as well as the risks entailed in delivering that software.

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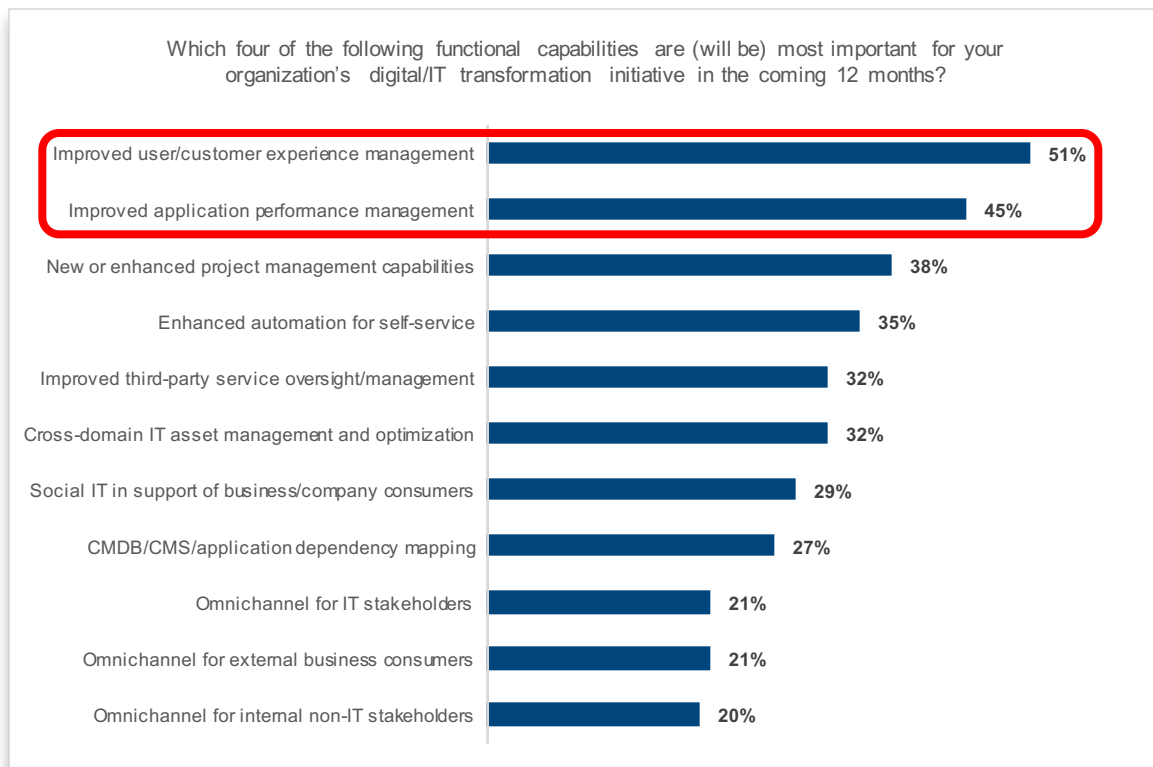

Which four of the following functional capabilities are (will be) most important for your organization's digital/IT transformation initiative in the coming 12 months?

Capability	%
Improved user/customer experience management	51%
Improved application performance management	45%
New or enhanced project management capabilities	38%
Enhanced automation for self-service	35%
Improved third-party service oversight/management	32%
Cross-domain IT asset management and optimization	32%
Social IT in support of business/company consumers	29%
CMDB/CMS/application dependency mapping	27%
Omnichannel for IT stakeholders	21%
Omnichannel for external business consumers	21%
Omnichannel for internal non-IT stakeholders	20%

Figure 1. User experience, performance management "most important" Digital Transformation initiatives for 2016

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[1] EMA, "Digital and IT Transformation: A Global View of Trends and Requirements," September 2015.

Microservices and the Empowered Consumer

At the same time, consumers have unprecedented power in determining the fate of a business. Poor application quality is no longer simply a matter of losing a single customer. With the rise of social media, customer perception also tinges the perceptions of other potential customers and, in doing so, influences buying habits.

Consumers expect rapid iterations in terms of new functionality, high levels of performance and availability, and applications that perform well regardless of the device being used to access them. In part to address the high expectations of empowered consumers, digital businesses are turning to microservice architectures.

Much touted as a new development and deployment model ideally suited for flexibly delivering software functions and features, microservices are designed or re-factored to be deployed as subsets of larger applications (see Figure 2). Each microservice encapsulates specific features in a small, flexible component. Microservices are then orchestrated and connected via APIs, with each small service performing a specific set of tasks and running as its own process.

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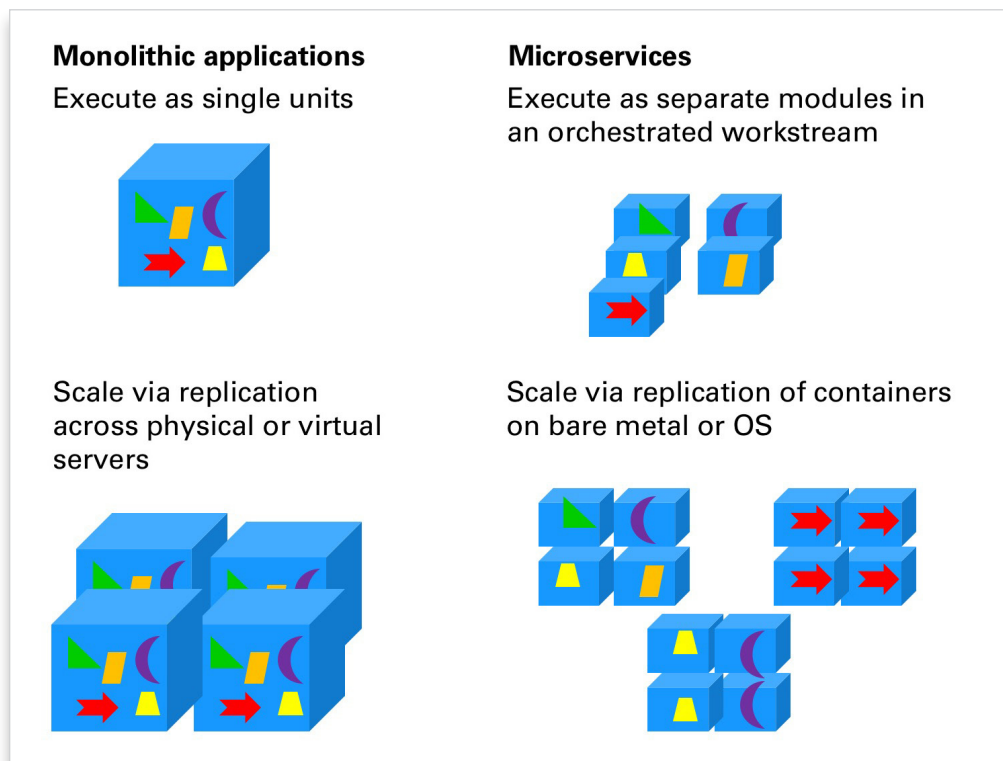
Microservices are used to create loosely coupled execution chains (versus the tightly coupled monolithic applications of past computing eras). This provides a basis for unprecedented flexibility, allowing the function of an application to be updated and changed without affecting other components comprising the execution workstream.

Monolithic applications
Execute as single units

Microservices
Execute as separate modules in an orchestrated workstream

Scale via replication across physical or virtual servers

Scale via replication of containers on bare metal or OS

Figure 2. Microservice architectures enable responsive scaling based on load, faster time to market for new functions and features

From the business-enablement perspective, microservice architectures accelerate time to market for new functions and features. Businesses can roll out new services faster, and customers have almost immediate access to the company's latest services. From the IT perspective, microservices enable responsive scaling based on load as well as faster time to market for new features and functions. And from the development perspective, they fit well into agile development practices and are faster to develop and modify than the monolithic enterprise applications running in many companies.

Often associated with containerization using platforms such as Docker, microservices then become portable in the sense that they are capable of running on any server supporting Docker—today most often a Linux-based server.

Tooling Considerations

While microservices provide a wide array of business and development benefits, from the support perspective they introduce complex management challenges. For example, many companies are still struggling with the complexities introduced by server virtualization. Virtual machines layer multiple applications and processing jobs onto a single server. While this maximizes server utilization, it also introduces a whole new level of risk associated with resource contention and overutilization. IT organizations are finding that virtualization can introduce application performance and availability issues that can be very difficult to trace and resolve.

Microservices and container-based technologies can introduce similar challenges, as well as challenges related to the monitoring and management of component-based, orchestrated services. More than 50% of IT organizations lack APM tools capable of tracing transaction execution across the hundreds or thousands of execution elements comprising a single component-based application. Questions related to topologies and dependencies can make it difficult to assess which elements support which applications, making root-cause analysis for performance problems difficult or impossible.

Deploying multiple instances of the same code as microservices (a requirement for scaling) can also have unexpected impact on infrastructure elements that function as part of the execution chain. Data and database integrity, for example, are far more difficult to ensure in a microservices architecture. API connections add performance risks since each integration point is also a potential point of failure. In short, without tools capable of monitoring API connections, network connections, component performance, and even performance of third-party services, integrated applications can be very difficult to troubleshoot when performance or availability issues occur.

To complicate matters, production environments are dynamically changing as Continuous Delivery of application code accelerates change rates. EMA research has found that increasing volumes of change are adversely impacting the quality of production applications and requiring both Development and Operations to spend more time on production support. Development is now spending as much time supporting production as it spends developing new code, and Operations teams are spending more time on application support than on any other single task type.

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CA Technologies Delivers Consolidated Approach to Application Performance Management (APM) Across Omnichannel, Microservices, and Cloud

All of the factors outlined above contribute to an escalating need for Application Management toolsets. CA Technologies has continued to enhance its CA Application Performance Management (APM)[2] solution to deliver seamless unified monitoring of infrastructure and applications, including containers, microservices, APIs, and mobile technologies. Functional integration across the product line has unified monitoring across tiers, from mobile to mainframe and across the entire delivery chain. In addition, by acting as a neutral "Switzerland" with a relentless focus on integrating with third-party solutions, CA enables companies to make the most of existing enterprise management assets while moving towards more modernized management strategies.

The company has also focused heavily on tools supporting preproduction testing and release automation, two areas proven to reduce the impact of production change. CA Service Virtualization[3], for example, enables development teams to do repetitive integration testing with no physical connection to a production environment. CA Release Automation[4] ensures that software is deployed exactly as designed and built, in a transparent manner, and as often as necessary to accommodate Continuous Delivery (and scaling/replication of microservices).

The CA API Gateway[5] delivers the final piece of the puzzle that is critical to omnichannel delivery. Supporting security, orchestration, and management of API-connected services, CA API Gateway has also been functionally integrated with CA APM, providing closed-loop monitoring and automation for API-connected applications and services.

Offering both on-premises and cloud-based products, CA Technologies is delivering tools that enable IT organizations to support modern applications and technologies at the speed of business, without missing a beat. This "Agile Operations" approach enables IT organizations to adapt to changing business needs and technologies while maximizing the utilization of valuable professionals and their unique skill sets.

In short, CA Technologies has seamlessly incorporated monitoring of modern applications into the product line, while focusing on ease of use and fast time to value. The result is a line of solutions that can significantly improve performance and availability of both omnichannel and traditional applications, reduce the amount of time Dev and Ops spend supporting production, and dramatically impact customer satisfaction and overall business growth.

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[2] More information available at www.ca.com/us/opscenter/ca-application-performance-management.aspx
[3] www.ca.com/us/devcenter/ca-service-virtualization.aspx
[4] www.ca.com/us/devcenter/ca-release-automation.aspx
[5] www.ca.com/us/securecenter/ca-api-gateway.aspx

EMA Perspective

Today's consumers are definitely in the driver's seat as far as buying patterns are concerned. The user experience has become critical to business growth, and a difference of a few seconds in response time can strongly influence a consumer's vendor choice and product selection.

At the same time, complex, diverse, and dynamically changing application landscapes have multiple implications for both IT and business. From the IT perspective, Dev and Ops are being pushed to their capacity limits. Fewer than 50% of IT professionals are confident that their Application Management solutions can adequately meet the monitoring requirements of modern IT environments. At the same time, the business needs these new types of services to satisfy existing customers and grow the customer base.

Tools-driven automation can help bridge the gaps between modern application complexity and the pitfalls of poor performance and availability. In a business environment where a hitch in any aspect of the user experience can make the difference between a sale and a lost customer, retailers and other businesses are finding that high-quality performance management tools are the answer.

By incorporating support for the latest business trends and industry technologies into its Application Performance Management solutions, CA Technologies offers a way for IT organizations to stretch budgets and the bandwidth of valuable IT assets while relentlessly focusing on the customer experience—regardless of the complexity of the monitored application.

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